MISSOURI DEPARTMENT OF NATURAL RESOURCES
AIR AND LAND PROTECTION DIVISION
ENVIRONMENTAL SERVICES PROGRAM
Standard Operating Procedures

SOP #: MDNR-WQMS-014 EFFECTIVE DATE: March 29, 2002

SOP TITLE: Procedures for Using the Coffelt, Inc. Backpack-Mounted Electrofishing Unit

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SUMMARY OF REVISIONS: Not applicable. This is a new SOP.

APPLICABILITY: The procedures described in this SOP are applicable to all ESP personnel who use the Coffelt, Inc. backpack-mounted electrofishing unit.

DISTRIBUTION: MoDNR Intranet
ESP FSS Section Chief
ESP SOP Coordinator
ESP WQMS Section Chief

RECERTIFICATION RECORD:

Date Reviewed				
Initials				

1.0 SCOPE AND APPLICABILITY

This SOP describes the procedures to be followed by Environmental Services Program (ESP) personnel when using the Coffelt, Inc. backpack-mounted electrofishing unit (see page 6). The unit may be used in surface waters of wadeable depth (3.0 ft. or less) to aid in the collection of fish.

2.0 SUMMARY OF METHOD

Fish are collected for tissue analysis (as indicators of ambient water and sediment quality) and other aquatic studies (population surveys, etc.). Fish are primarily collected by means of commercially manufactured electrofishing units. The ESP utilizes either a boat-mounted unit manufactured by Smith-Root, Inc. (see MDNR-WQMS-013) or a backpack-mounted unit manufactured by Coffelt, Inc. This SOP details the set-up and operation of the backpack-mounted unit.

3.0 HEALTH AND SAFETY REQUIREMENTS

3.1 General safety issues to be addressed prior to sampling should include safe wading practices and the proper operation of the backpack-mounted electrofishing unit. Members of the sampling crew (composed of the team leader and sampling assistant) must be aware of the hazards inherent in working on and in water with electrical current. It is the responsibility of the team leader to inform the sampling assistant of proper safety procedures and techniques used in operating the electrofishing equipment.

3.2 Personnel participating in collection activities should be certified in both the American Red Cross standard first aid and cardiopulmonary resuscitation. Participation in the MDNR medical monitoring program in accordance with the Air and Land Protection Division medical monitoring policy is required.

3.3 Personal safety equipment including rubber electrical linemen gloves, hearing protection, and non-breathable hip boots or waders must be worn at all times during the electrofishing collection process.

4.0 PERSONNEL QUALIFICATIONS

Primary responsibility for successful implementation of electrofishing procedures rests with the team leader. The team leader must be responsible for the start-up and operation of the backpack-mounted electrofishing unit and also the training of the crew members. The crew members must be aware of the inherent dangers involved in the set-up and use of the equipment. The team leader of the sampling crew must have received formal training on the principles and techniques of electrofishing prior to use of the specialized electrofishing unit. Refer to the United States Fish and Wildlife Service (USFWS) manual entitled *Principles and Techniques of Electrofishing.*

5.0 SUPPLIES AND EQUIPMENT

The following supplies and equipment are needed to properly operate the backpack-mounted Coffelt, Inc. electrofishing unit.

- Coffelt, Inc. backpack-mounted electrofishing unit
- Fiberglass anode pole w/attached electrode and coiled cord
- Steel cathode cable
- Premixed gas can for generator (with 2-cycle oil, 50:1 ratio)
- Life jackets for each person
- Hearing protection for each person
- Rubber lineman gloves for each person
- Hip boots/waders (non-breathable) for each person
- First aid kit
- Fire extinguisher
- Fish holding tank
- Cellular phone
- Specific conductivity meter

6.0 PRELIMINARY PREPARATIONS

The sampling crew should consist of the team leader and a minimum of one crew member. The team leader will be responsible for netting of fish specimens and assisting the other crew member in the proper wearing, set-up, and starting of the backpack unit. The crew member wearing the unit will conduct the actual shocking by placing the anode and cathode in the proximity of likely fish habitat while the team leader stands just downstream with the dipnet. With proper training the duties of the team leader and crew member may be interchanged so as not to physically exhaust the one wearing the backpack unit. Additional crew members (for blocking with seines, etc.) may be desired depending on the scope and nature of collections required.

The Coffelt, Inc. backpack-mounted electrofishing unit consists of a Honda 350EX generator, a CPS™ (complex pulse system) control unit, a five-foot fiberglass handled anode pole (with six-foot coiled cord, remote switch, and attached electrode), and a six-foot steel cable cathode. The generator and control unit are mounted on a nylon pack frame with padded hip and shoulder pads. See page 6 for a photo of the unit. Refer to the Coffelt, Inc. manual entitled *Instruction Manual for the VARIABLE VOLTAGE PULSATOR BACKPACK ELECTROSHOCKER MARK-10* and the Honda Power Equipment *Owner's Manual EX350* for further information. The backpack-mounted unit should not be exposed to inclement weather and care should be taken when transferring it from the vehicle to the sampling site.

6.1 Fuel the generator by removing the control unit from the backpack by releasing the rubber hold-downs located at each side of the unit. Use regular unleaded gasoline premixed with TC-W 2-cycle oil at a 50:1 ratio (one gallon of gas to 2.5 oz. of oil). To

avoid spillage pour fuel mix through a funnel and take care not to overfill. Tighten the fuel cap after filling and replace the generator on the backpack

6.2 Prior to starting the generator, personnel should put on hip boots or chest waders and check for any leaks by wading out to electrofishing depth. The assistant should then help the team leader in putting on the backpack and making any adjustments necessary for a comfortable fit. The assistant should then connect the 4-pin male plug from the steel cable cathode to the electrode outlet on the control unit. Then connect the 4-pin male plug from the 6-ft. coiled cord of the anode pole to the 4-pin plug (female) connection on the steel cable cathode. Check to ensure the electroshocker plug (from the control unit) is inserted into the AC receptacle on the generator. The sampling team members should then put on the rubber lineman gloves and walk into shallow water while making sure the cathode cable is submerged.

7.0 STARTING PROCEDURES (to be done by assistant)

Check the following settings on the control unit prior to starting the generator.

- Set the power switch to *OFF* position.
- Set the *OUTPUT VOLTAGE* switch to *300 volts*.
- Set the *FREQUENCY* switch to *CPS*.
- Reset the *SHOCKING TIME* meter.
- Set the Honda generator switch to the *300 VA* position.
- Turn the fuel cap lever fully clockwise to the *ON* position.
- Move the generator switch to the *CHOKE* position (cold engine only).
- Start the generator by pulling the recoil starter.
- Set the *POWER* switch to *ON*. The *AUDIO* overload warning will be activated for a few seconds. When the beeps cease the unit is ready.
- Squeeze the hand-operated remote switch (mounted on the fiberglass anode/electrode pole) to apply current while moving the anode electrode toward the steel cable cathode.

Have the assistant read the number of amps of current output from the amp meter located on the control unit. Aim for a setting of 5 amps. If amperage exceeds 7 amps, reduce the voltage setting to drop amperage and prevent the unit from overloading. Overloading occurs at 10 amps. Conversely, if less than 5 amps is put out the voltage may be increased to deliver 5 amps of output. Electrofishing should be conducted at the minimum power necessary to efficiently stun

the targeted fish while preventing unnecessary injury to other fish species that enter the electrical field.

8.0 ADDITIONAL CONSIDERATIONS

8.1 The set-up of the electrofishing equipment described herein delivers a pulsed DC current which will effectively incapacitate fish (or animals and humans, for that matter) when in close proximity to the electrode and cathode. The electrical field is most intense close to the electrodes but can extend outward some distance depending on the water's temperature, conductivity, and amperage used.

8.2 Before activating the hand-operated remote switch and beginning electrofishing, ensure that all team members are in view at all times. Never apply power when team members are behind you or otherwise out of view.

8.3 The operation of the backpack-mounted electrofisher can be interrupted by either the operator through the hand-operated remote switch on the fiberglass anode/electrode pole or by an internal tilt switch located in the generator. The latter method is a safety feature which would cut the power in the event the operator would stumble or fall while operating the unit.

8.4 All operations should be suspended during lightning or thunderstorms. Discretion is advised during periods of rain.

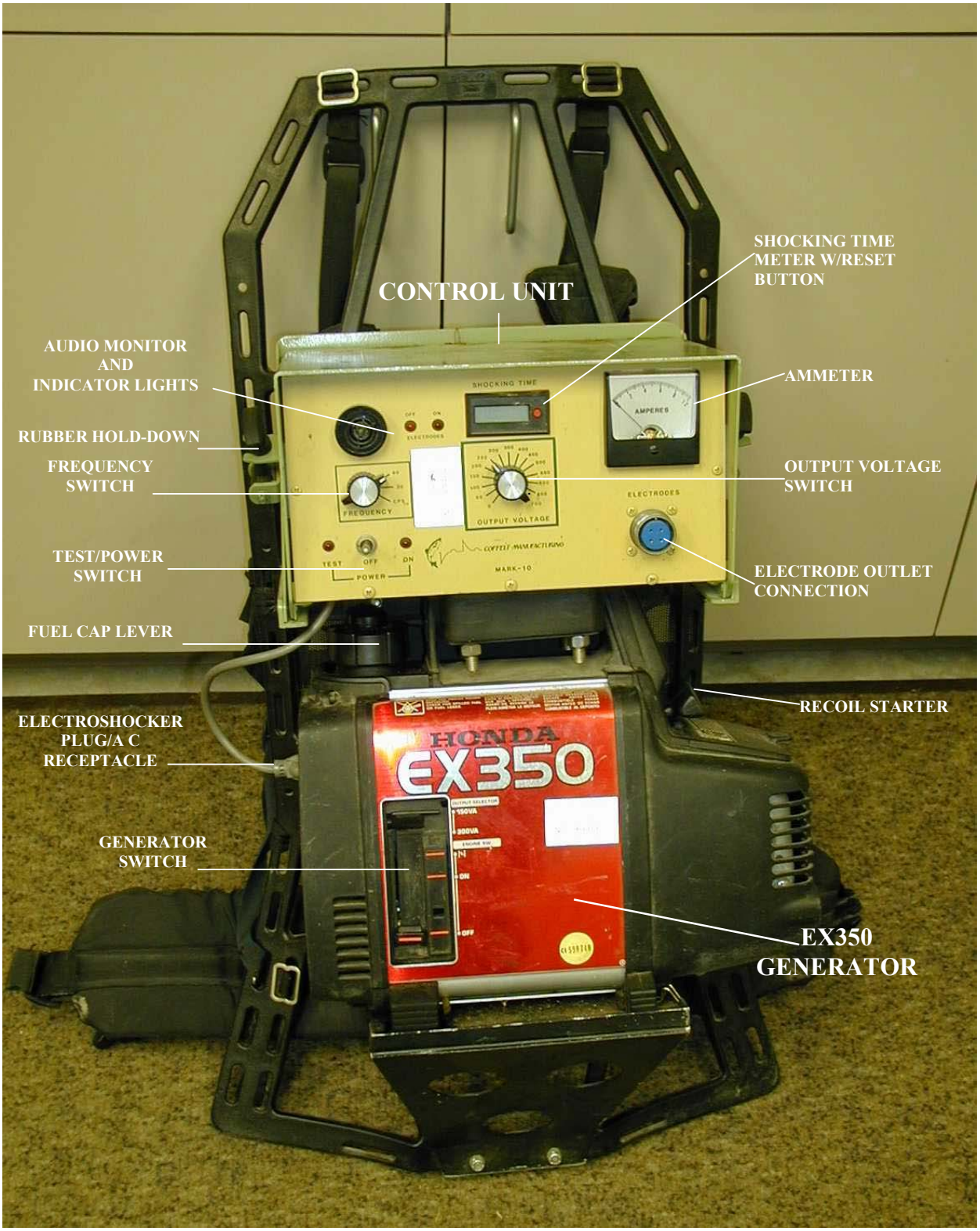
9.0 REFERENCES

Coffelt, Inc., *Instruction Manual for the VARIABLE VOLTAGE PULSATOR BACKPACK ELECTROSHOCKER MARK-10*, 1988.

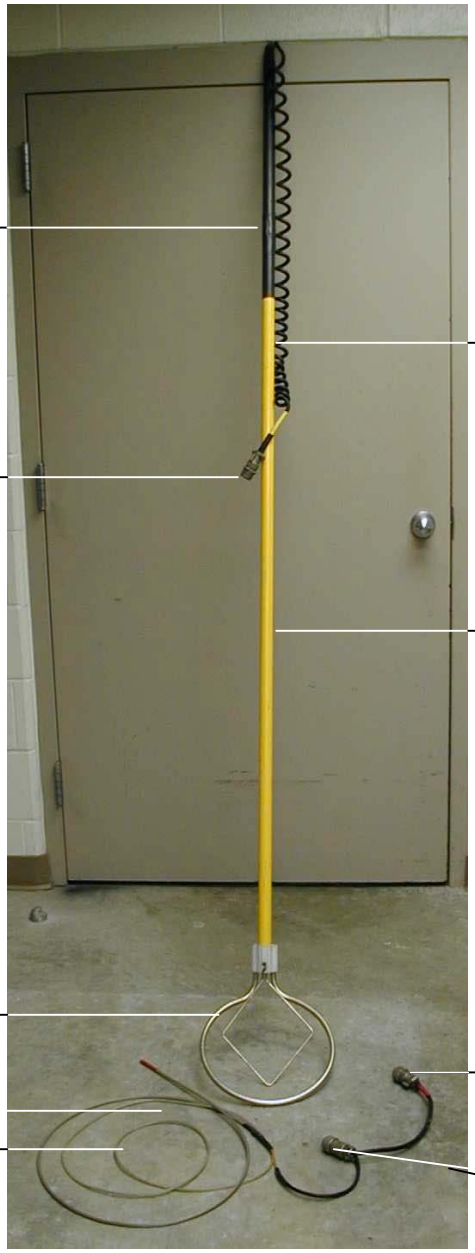
Honda Motor Company, L.T.D., Honda Power Equipment, *Owner's Manual EX350*, 1988.

USFWS, Office of Training and Operations, *Principles and Techniques of Electrofishing.*

Coffelt, Inc. VARIABLE VOLTAGE PULSATOR BACKPACK ELECTROSHOCKER



Coffelt, Inc. Anode Pole with Cathode Cable



HAND-OPERATED REMOTE SWITCH

6-FT. COILED ANODE CORD

4-PIN (MALE) CONNECTION FOR 4-PIN PLUG ON CATHODE

FIBERGLASS ANODE POLE

DUAL ELECTRODE

4-PIN (FEMALE) PLUG FOR 6-FT. COILED ANODE CORD CONNECTION

6-FT. STEEL CABLE CATHODE

4-PIN (MALE) CONNECTION FOR ELECTRODE OUTLET ON CONTROL UNIT